

# **Spot Safety Project Evaluation**

Project Log # 200704284

Spot Safety Project # 07-00-216

## **Spot Safety Project Evaluation of the Installation of Pedestrian Signal Heads And Push Buttons at the Intersection of SR 1902 (Manning Dr) and West Dr Orange County**

Documents Prepared By:

Safety Evaluation Group  
Traffic Safety Systems Management Section  
Traffic Engineering and Safety Systems Branch  
North Carolina Department of Transportation

### **Principal Investigator**

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Brad Robinson, EI

7/25/2008

Date

Traffic Safety Project Engineer

## ***Spot Safety Project Evaluation Documentation***

### **Subject Location**

Evaluation of Spot Safety Project Number 07-00-216 – The Intersection of SR 1902 (Manning Dr) and West Dr in Orange County.

### **Project Information and Background from the Project File Folder**

The spot safety project improvement countermeasure chosen for the subject location was the installation of pedestrian signal heads and push buttons across both sides of West Dr. There were already pedestrian signal heads across both sides of SR 1902.

The subject intersection is a signalized four-leg intersection. SR 1902 (Manning Dr) has two-lane approaches with a thru-left and a thru-right lane. West Dr is a southbound one-way street with three lanes; a thru, a thru-left, and a right turn lane. The speed limit is 25 mph on SR 1902 and is not posted on West Dr.

The original statement of problem was that there was a potential for pedestrian accidents. There is heavy pedestrian traffic in the area due to the hospital and the university. The improvements were requested by the Chapel Hill Pedestrian Safety Committee.

The initial crash analysis was conducted from August 1, 1997 to July 31, 2000 with a total of 6 crashes, none of which were considered correctable by the chosen countermeasure. The final completion date for the improvements at the subject intersection was on February 1, 2002 with a total cost of \$15,000.00.

### **Naive Before and After Analysis**

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from December 1, 2001 to March 31, 2002. The before period consisted of reported crashes from April 1, 1996 through November 30, 2001 (5 years and 8 months) and the after period consisted of reported crashes from April 1, 2002 through November 30, 2007 (5 years and 8 months). The ending date for this analysis was limited by the available crash data at the time the analysis was conducted.

The treatment data consisted of all reported crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Pedestrian Crashes involving pedestrians crossing West Dr were the Target Crashes for the applied countermeasure.

<b><u>Treatment Information</u></b>			
	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-) Percent Increase (+)</b>
Total Crashes	16	12	-25.0
Total Severity Index	4.24	1.62	-61.8
Target Crashes	0	0	N/A
Target Crash Severity Index	0	0	N/A
Volume	16,000	15,500	-3.1
<b><u>Crash Severity Summary</u></b>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	4	1	-75.0
Class C Crashes	3	0	-100.0
PDO Crashes	9	11	22.2

The naive before and after analysis at the treatment location resulted in 25 percent decrease in Total Crashes, no Target Crashes in either period, and a 3 percent decrease in Average Daily Traffic (ADT). The before period ADT year was 1999 and the after period ADT year was 2005.

## Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 25 percent decrease in Total Crashes and zero Target Crashes in either period. The Total Severity Index decreased by 61 percent.

The calculated benefit to cost ratio for this project is 7.22 considering total crashes. The benefit to cost ratio considering only target crashes is -0.00. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

There was a single non-target Pedestrian Crash in the after period. The pedestrian was crossing SR 1902 on the east side of the intersection and was hit by a left turning vehicle from West Dr, resulting in a 'B' injury to the pedestrian. This pedestrian movement already had pedestrian signals prior to the project.

The decrease in Total Crashes and the Total Severity Index, as well as the benefit to cost ratio, appear to be unrelated to the project. There were six Frontal Impact Crashes in the before period, all resulting in injuries. The crashes in the after period were largely Rear-End and Sideswipe Crashes, which are generally less severe than Frontal Impact Crashes (the only injury crash in the after period was the above mentioned pedestrian crash).

We do not have pedestrian counts at this intersection so it is not known if there was a change in the number of pedestrian conflicts from the before to the after period.

As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of roadway.

**BENEFIT-COST ANALYSIS WORKSHEET**

LOCATION: SR 1902 at West Dr  
COUNTY: Orange  
FILE NO.: SS 07-00-216

BY: BDR  
DATE: 7/11/2008

DETAILED COST: TYPE IMPROVEMENT - Pedestrian heads and push buttons

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$15,000	10	0.149	\$2,235
Right-of-Way	\$0	0	0.000	\$0

TOTALS	\$15,000	10	0.149	\$2,235
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ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$200
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$150
TOTAL ANNUAL COST=	\$2,585
TOTAL COST OF PROJECT=	\$15,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.67	0	0.00	7	1.23	9	1.59	\$29,965
AFTER	5.67	0	0.00	1	0.18	11	1.94	\$11,305

Annual Benefits from Crash Cost Savings	\$18,660
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NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST	=	\$16,074
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST	=	7.22

TOTAL COST OF PROJECT	-	\$15,000	COMPREHENSIVE B/C RATIO	-	7.22
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# BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1902 at West Dr  
COUNTY: Orange  
FILE NO.: SS 07-00-216 Target Crashes

BY: BDR  
DATE: 7/11/2008

DETAILED COST: TYPE IMPROVEMENT - Pedestrian heads and push buttons

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$15,000	10	0.149	\$2,235
Right-of-Way	\$0	0	0.000	\$0

TOTALS	\$15,000	10	0.149	\$2,235
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ESTIMATED INCREASE IN ANNUAL MAINT. COST =	\$200
ESTIMATED INCREASE IN ANNUAL UTILITY COST =	\$150
TOTAL ANNUAL COST=	\$2,585
TOTAL COST OF PROJECT=	\$15,000

COMPREHENSIVE COST REDUCTION:

## ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

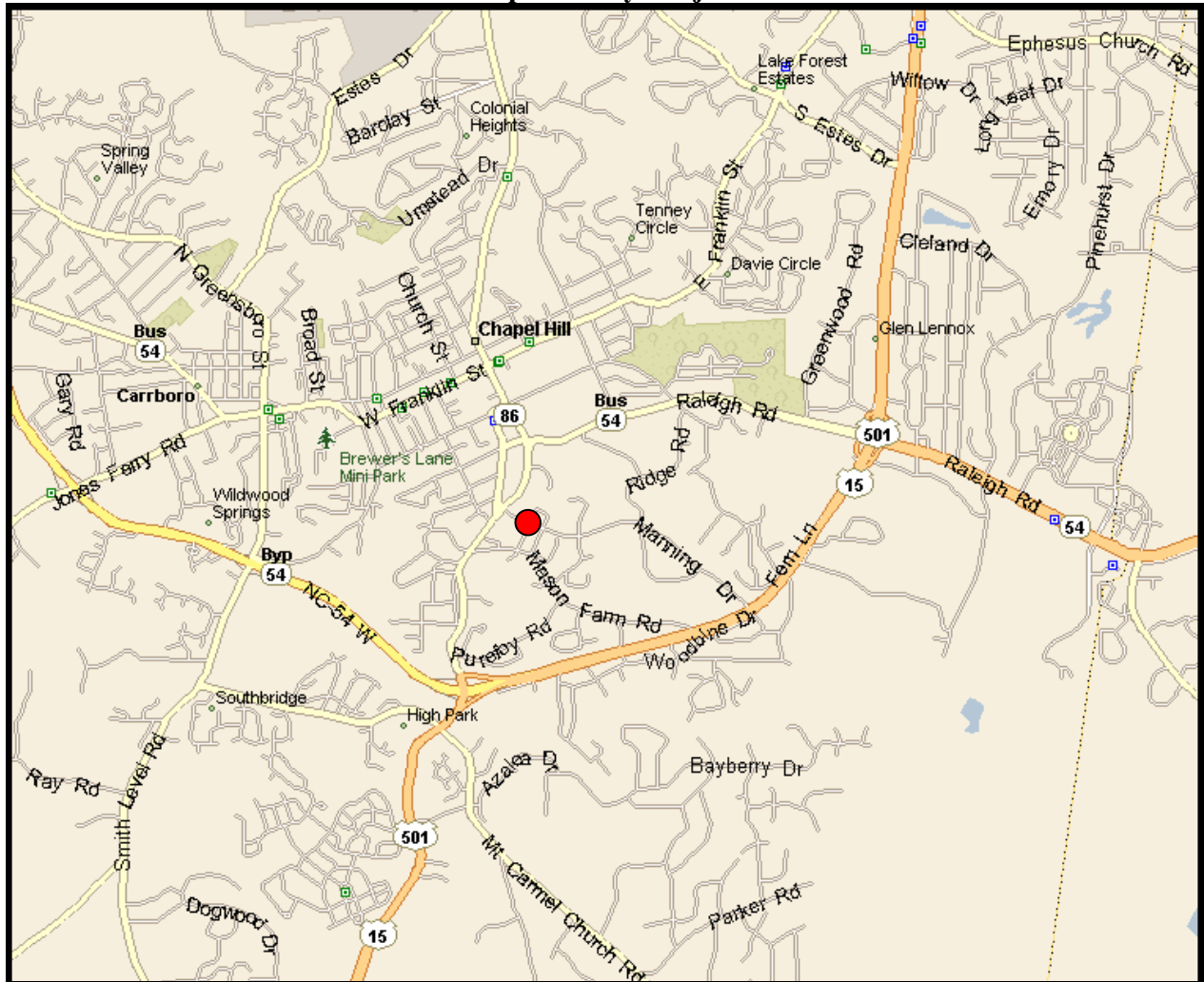
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.67	0	0.00	0	0.00	0	0.00	\$0
AFTER	5.67	0	0.00	0	0.00	0	0.00	\$0

Annual Benefits from Crash Cost Savings	\$0
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NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST	=	(\$2,585)
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST	=	0.00

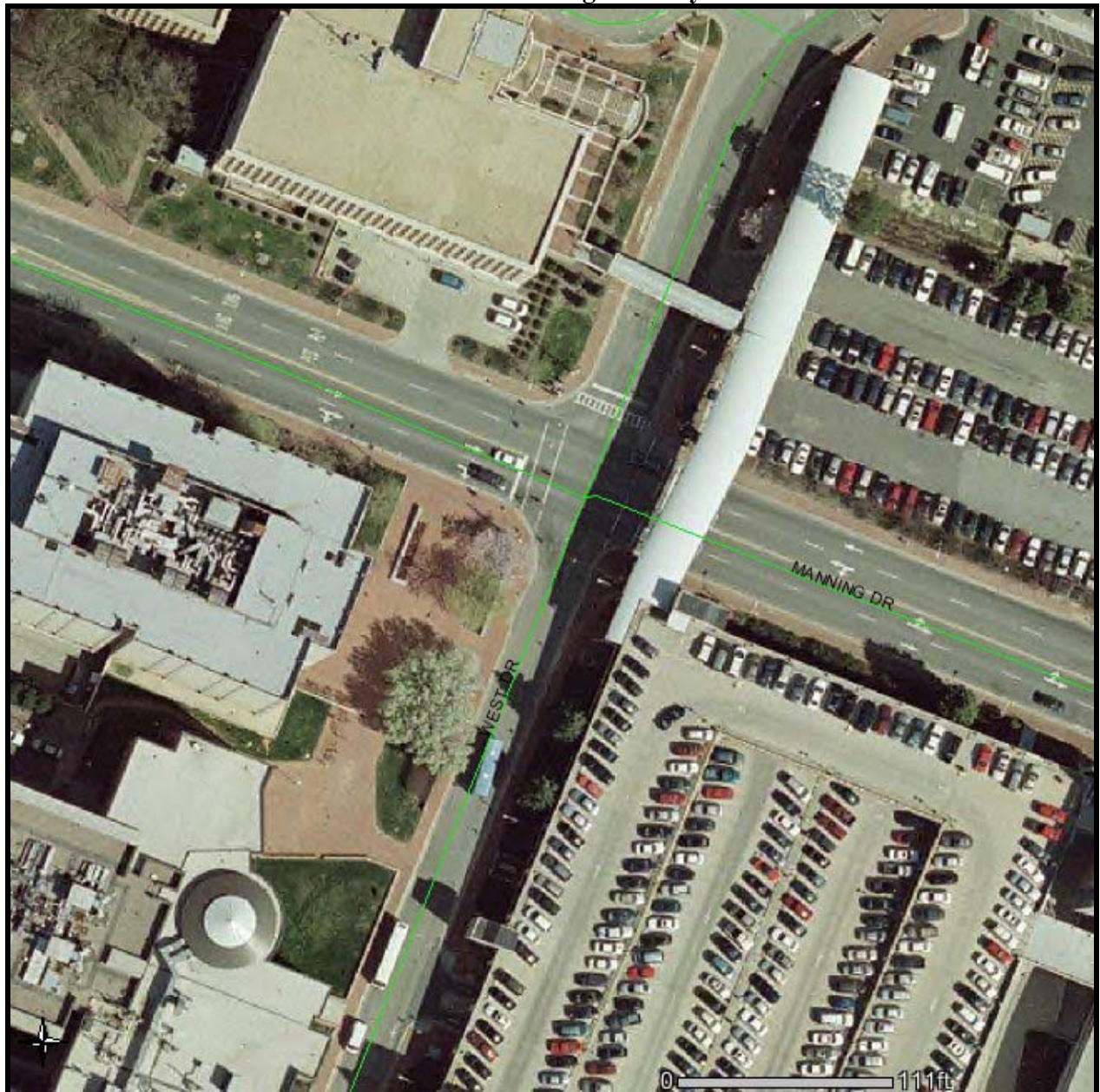
TOTAL COST OF PROJECT	-	\$15,000	COMPREHENSIVE B/C RATIO	-	0.00
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**Location Map**  
**Orange County**  
**Evaluation of Spot Safety Project #07-00-216**



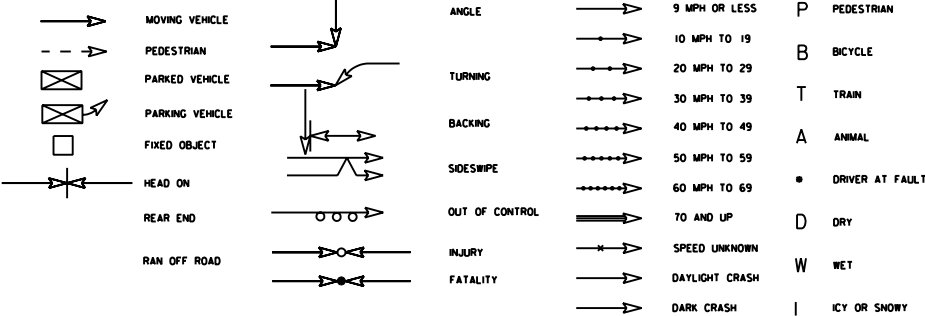
Treatment Location: SR 1902 (Manning Dr) at West Dr in Chapel Hill

2003 Aerial Photo from Orange County GIS Website



Orange County  
SR 1902 (Manning Dr) and West Dr  
Before Period  
From 4/1/1996-11/30/2001

LEGEND



SR 1902  
(MANNING DRIVE)  
25 mph

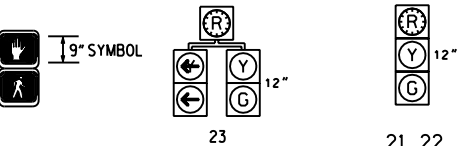
WEST DRIVE  
Not Posted

SR 1902  
(MANNING DRIVE)  
25 mph

WEST DRIVE  
Not Posted

SIGNAL FACE I.D.

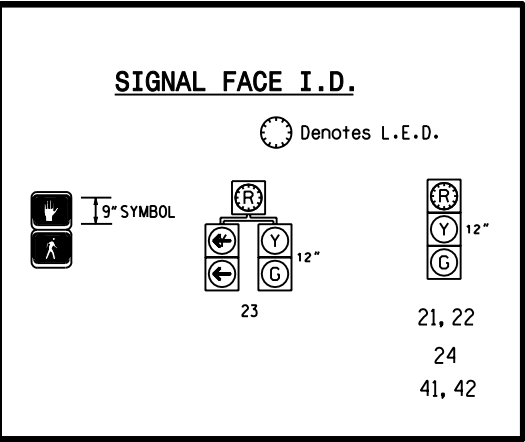
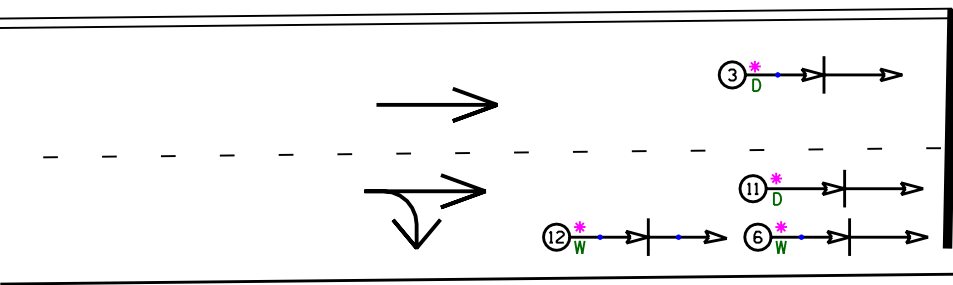
Denotes L.E.D.



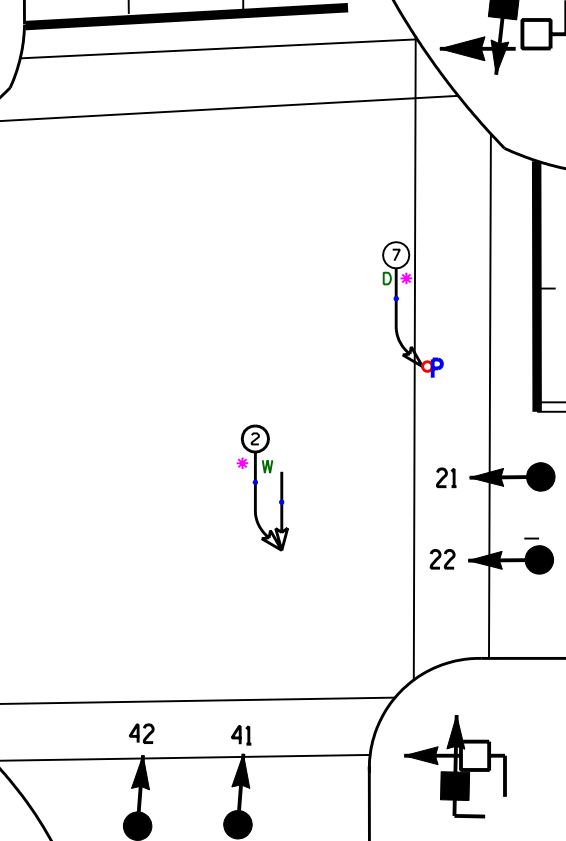
TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT		COLLISION DIAGRAM	
HIGHWAY SAFETY IMPROVEMENT PROGRAM		SAFETY INFORMATION MANAGEMENT AND SUPPORT	
		DIVISION: 7	AREA: ..
		STUDY PERIOD: 4/1/1996 TO 11/30/2001	
		DISTANCE: ..... Y-LINE: 150 FT	
		ANALYSIS PREPARED BY: B. Robleson	
		DIAGRAM PREPARED BY: B. Robleson	
DIAGRAM REVIEWED BY: .....			
SAFETY EVALUATION		TRAFFIC SAFETY	
BEFORE			
		SCALE: NOT TO SCALE	
		DATE: Apr 11 2008	
		LOG NUMBER: 200704284	
N.C. DEPARTMENT of TRANSPORTATION			
DIVISION of HIGHWAYS			
TRAFFIC ENGINEERING AND SAFETY			
SYSTEMS BRANCH			

Orange County  
SR 1902 (Manning Dr) and West Dr  
After Period  
From 4/1/2002-11/30/2007

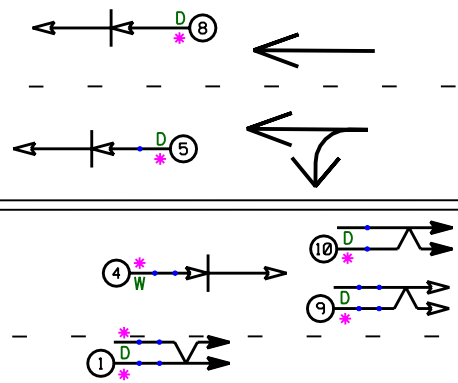
SR 1902  
(MANNING DRIVE)  
25 mph



WEST DRIVE  
Not Posted



SR 1902  
(MANNING DRIVE)  
25 mph



LEGEND

MOVING VEHICLE	ANGLE	9 MPH OR LESS	P PEDESTRIAN
PEDESTRIAN	TURNING	10 MPH TO 19	B BICYCLE
PARKED VEHICLE	BACKING	20 MPH TO 29	T TRAIN
PARKING VEHICLE	SIDESWIPE	30 MPH TO 39	A ANIMAL
FIXED OBJECT	OUT OF CONTROL	40 MPH TO 49	• DRIVER AT FAULT
HEAD ON	INJURY	50 MPH TO 59	D DRY
REAR END	FATALITY	60 MPH TO 69	W WET
RAN OFF ROAD		70 AND UP	I
		SPEED UNKNOWN	
		DAYLIGHT CRASH	

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT		COLLISION DIAGRAM	
HIGHWAY SAFETY IMPROVEMENT PROGRAM		SAFETY INFORMATION MANAGEMENT AND SUPPORT	
		DIVISION: 7	AREA: ..
		STUDY PERIOD: 4/1/2002 TO 11/30/2007	
		DISTANCE: ..... Y-LINE: 150 FT	
		ANALYSIS PREPARED BY: B. Robleson	
		DIAGRAM PREPARED BY: B. Robleson	
DIAGRAM REVIEWED BY: .....			
SAFETY EVALUATION		TRAFFIC SAFETY	
AFTER		SCALE: NOT TO SCALE	
		DATE: Apr 11 2008	
		LOG NUMBER: 200704284	
N.C. DEPARTMENT of TRANSPORTATION			
DIVISION of HIGHWAYS			
TRAFFIC ENGINEERING AND SAFETY			
SYSTEMS BRANCH			